54.) Both designs have their downside: smaller rings lead to very high ring interconnection costs, while larger rings are more difficult to load without exhausting the fixed line capacity between nodes. (VZ-VA Br. at 119.) Verizon's engineering experts concluded that, when all these competing concerns were taken into account, a six-node ring produced the best estimate of forward-looking IOF electronics costs.[83/]

AT&T/WorldCom's primary criticism of Verizon VA's IOF model is that it does not mirror the "consistent number of nodes per ring in [Verizon's current] network." (AT&T/WCom Br. at 189.) They accordingly dismiss the model as a "gimmick to increase costs." (AT&T/WCom Br. at 190.) It is nothing short of amusing that in this lone instance, Petitioners are suddenly arguing that the mere fact that Verizon VA does something in its existing network necessarily makes it the most efficient solution available.[84/] While Verizon VA obviously believes that the current network should be the starting place for a TELRIC analysis, Verizon VA's study recognizes that "the enhanced capabilities of the latest generation of SONET technology and operations" would make it more efficient to use larger rings than those in the existing network. (VZ-VA Ex. 122 at 156.)

83/ In calculating the *per-mile* costs for the IOF model, Verizon VA's engineers determined it most efficient to assume the approximately 3.79 rings per node that currently exist in Verizon VA's network. This conclusion is based on the fact that the SONET ring dimensions in a forward-looking network should be similar to those in the existing network, "since the same places have to be connected." (Tr. at 5629 (Gansert);) (*see also* VZ-VA Ex. 122 at 154-55.)

84/ Petitioners cannot seem to make up their mind even while criticizing Verizon VA for assuming that the forward-looking network might differ from the current one, they argue that in the forward-looking IOF network, the "routing of interoffice facilities (IOF) would be more efficient, which would reduce testing, maintenance and other expenses." (AT&T/WCom Ex. 18P at 11.) As Verizon VA has previously explained, "[I]n the forward-looking network, the ring dimensions would mirror the dimensions of rings in the existing network, 'since the same places have to be connected.'" (Tr. at 5629 (Gansert).)

Thus, notwithstanding that the number of nodes per ring in the current network is on average lower than in its IOF model, Verizon VA believes that the six-node design is the best estimate for the forward-looking, cost-minimizing design for the IOF UNE. Other regulatory tribunals, reviewing the same IOF cost model that Verizon VA has presented here, have agreed.[85] Indeed, although Petitioners point to the 3.76 node-per-ring average in the embedded New York network, they fail to acknowledge, let alone respond to, the fact that in the New York UNE proceeding, Verizon's model was approved.[86]

Nor are AT&T/WorldCom correct in arguing that the six nodes-per-ring figure used to estimate Verizon VA's fixed IOF costs "result[] in higher costs and less efficient use of the electronics placed on the ring." (AT&T/WCom Br. at 190.) Although Petitioners seem to believe that one can simplistically reduce the number of rings and produce lower costs, Mr. Gansert explained that "[t]he cost of two node rings versus eight node rings . . . is not a linear relationship." (Tr. at 5632.) Reducing the number of nodes typically produces higher intermediate channel termination costs, for example, because smaller rings mean it is more likely that the node at which a call needs to terminate is not on the ring on which it is initiated. Notably, AT&T/WorldCom do not even *mention* intermediate channel termination or ring interconnection in their brief or their testimony.

85/ *See New York UNE Rate Decision* at 123-24; *see also* Summary Order of Approval *In re Board's Review of UNE Rates, Terms and Conditions of Bell Atlantic New Jersey, Inc.*, Docket No. TO00060356, (Dec. 17, 2001).

86/ *New York UNE Rate Decision* at 123-24.

2. No Changes to Verizon VA's Transport EF&I Factor Are Warranted.

In their brief, AT&T/WorldCom persist in their argument that Verizon VA's Virginia-specific transport transmission EF&I factor must be modified on the basis of the EF&I factor used in the *New York* UNE proceeding. This makes no sense. As Verizon VA has repeatedly noted, the 53.2% in-place factor that is used in the IOF study is based on Verizon's actual 1998 accounting data. It thus reflects the best estimate of the forward-looking EF&I costs that Verizon VA will experience and that any carrier is likely to experience with respect to the IOF transmission equipment in an IOF network in Virginia.

Petitioners do not support their contention that the EF&I costs produced by the factors used in Verizon VA's UNE studies are higher than actual EF&I costs in Virginia are or will be. They do not, for example, seek to demonstrate or even suggest that the 1998 costs were a fluke or are likely to change in the future and thus are not forward-looking. Instead, they do little more than point to the fact that the EF&I factor used in the New York UNE proceeding is different and suggest that the data that Verizon VA used in these proceedings therefore must be fraudulent. As Petitioners assert, "there is no reason to *believe*" that Verizon VA's EF&I costs are what it has represented. (AT&T/WCom Br. at 192 (emphasis added).)

The Commission should refuse to countenance such an unfounded and inappropriate attack. It is inappropriate to accuse a participant in a Commission proceeding of dissembling when there is no evidence whatsoever to support the allegation. The New York EF&I factor to which Petitioners seek to compare the Virginia EF&I factor relates to a different equipment mix placed in a different year. (VZ-VA Ex. 122 at 162-63.) That the two factors are different thus proves nothing other than that entirely different circumstances produce entirely different costs. Verizon VA's EF&I costs in 1998 fully support the EF&I factor Verizon used in its study.[87]

3. Verizon VA Is Not Required to Offer Digital Cross-Connect Systems as a Stand-Alone Service.

Finally, AT&T/WorldCom are incorrect when they argue that Verizon VA may not include digital-cross-connect systems (DCS) costs within the rate for the IOF UNE. Petitioners' basis for this assertion is that "CLECs may not want DCS." (AT&T/WCom Br. at 190). But as Mr. Gansert explained, the DCS equipment included in the IOF UNE is a fundamental, inseparable component of providing service, "used almost exclusively for managing and operating the backbone network of the company." (Tr. at 5618.) This is simply *not* the "optional" DCS equipment to which Petitioners or their witnesses refer — equipment that is used to provide optional access services to the CLEC.[88] Petitioners have sought to obfuscate the record, creating, as Mr. Gansert testified, "a tremendous amount of confusion on this issue because there were . . . a number of types of digital cross-connection systems." (Tr. at 5617.) The DCS costs that *are* included are not optional or avoidable but a fundamental and integral

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[87] Petitioners argue that the fact that Verizon uses many of the same vendors in New York and Virginia somehow supports the argument that the EF&I factors for these proceedings must mirror the New York EF&I factor. But that is a non sequitur. The fact that the same vendor theoretically might have placed the equipment does not mean the equipment placed or the material or installation costs were identical in the two periods at issue. In fact, the percentage of hardwired equipment placed was far greater in 1998 than in previous years, and thus the Virginia EF&I factor based on 1998 data would naturally reflect the higher EF&I costs associated with hardwired, as opposed to plug-in equipment.

[88] Indeed, the question whether such optional DCS should be offered as a UNE has been an issue on the non-cost side of these proceedings.

cost of providing IOF service to *any* customer. It would be entirely inappropriate to back out of the IOF study the cost of DCS used for customer-specific IOF needs.[89]

C. Switching Costs

Verizon VA's switching rates are based on recent, real-world data concerning switching costs, and estimate, within the constraints of TELRIC, the efficient, forward-looking costs of providing switching UNEs in Virginia. Although Petitioners insist that their switching cost study "clearly complies with TELRIC" (AT&T/WCom Switching Br. at 1), in fact, their switch discount, which they themselves contend "is the most important issue in determining appropriate switch cost investments" (AT&T/WCom Switching Br. at 5), has been specifically rejected by both the Commission and the D.C. Circuit as not complying with TELRIC. Moreover, AT&T/WorldCom's switching rates are based on a study created for a purpose wholly separate from estimating UNE costs and rely on data collected from switches that were deployed nearly a decade ago. Petitioners thus could not be more wrong when they state that Verizon VA "does not seriously dispute that [AT&T/WorldCom's version of] the Synthesis Model switching cost methodology is based on long-run and forward-looking principles." (AT&T/WCom Switching Br. at 1.)

Petitioners' switching rate study and their criticisms of Verizon VA's approach not only fail to comply with TELRIC, but also are inherently economically flawed and irrational. To

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[89] Verizon VA explained in its initial brief why the MSM's interoffice (IOF) transport module is inappropriate for use in a UNE proceeding. AT&T/WorldCom offer no new arguments in support of this flawed module. Indeed, Petitioners expend a mere two sentences defending it in their brief, and otherwise focus on defending their restatement of Verizon VA's transport rates, which, as we have shown, is without merit. (AT&T/WCom Br. at 188-90.)

support the lower costs they propose, AT&T/WorldCom advance wildly unrealistic assumptions — such as a network with 82% GR-303 (VZ-VA Switching Br. at 13) — that would produce a network incapable of providing reliable and efficient service in Virginia, or any other state. Moreover, Petitioners' approach is predicated on a desire to make Verizon VA pay an inordinate substantially subsidize CLEC access to its switching network. Thus, without regard to cost causation principles, Petitioners severely understate the traffic sensitive portion of switching resources based on a simplistic and ultimately erroneous vision of switch design. Petitioners' remaining criticisms of Verizon VA's approach are likewise baseless.

1. Switch Discount

As Petitioners themselves concede, "cost models must use the appropriate discount in determining switching costs in accordance with TELRIC." (AT&T/WCom Switching Br. at 5.) Yet other than mouth these words, Petitioners have done nothing to estimate a switch discount that bears any relationship to the discount that any carrier ever would or could hope to obtain when deploying a real-world switching network. Verizon VA, by contrast, has provided the best available estimate of the discounts that Verizon VA would realistically receive to incrementally grow and expand its switching network.[90] (VZ-VA Switching Br. at 3-6.)

Both sides generally agree that, in a market where carriers typically purchase a mix of new switch and growth equipment, vendors generally offer new switches at higher discounts than

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[90] Petitioners' assertion that the MSM's per line switching is similar to Verizon VA's per line cost for Nortel lines (AT&T/WCom Switching Br. at 11) is misleading. As Dr. Tardiff explained, the MSM produces an average total cost per line of $112, including all loadings and other relevant costs, compared to Verizon VA's average per line cost of $285. (Tr. at 5305.)

they do the growth equipment.[91] (*See* AT&T/WCom Switching Br. at 12-13.) Thus, a key issue for estimating the switch discount is determining the appropriate mix of new versus growth or add-on switching equipment. Petitioners persist in arguing that the inclusion of any growth equipment at all in a TELRIC switching study is invalid, and that the only viable approach under TELRIC is to assume a network built with all new switches "sized to serve existing demand and future line growth" purchased at the new switch discount. (AT&T/WCom Switching Br. at 10, 15). Yet as Verizon VA has shown, the Commission, the D.C. Circuit, and other state commissions have flatly rejected this inherently unrealistic approach as inappropriate for use in TELRIC pricing. (*See* VZ-VA Switching Br. at 6-11.)

This Commission has recognized that no efficient carrier would purchase an entire network worth of switches sized to serve current demand, and TELRIC switching costs accordingly should not be based on this assumption. The Commission has made this point repeatedly, most recently in its reply brief before the Supreme Court, and also in approving Verizon's Section 271 application for New York — a conclusion that the D.C. Circuit then affirmed.[92] As the Commission has explained, switching costs in a TELRIC study should "not assume that an efficient carrier would provide the switching element with large capacity

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91/ As Verizon VA previously explained and discussed below, however, the available discounts depend on the mix of new and growth purchases that are assumed. In particular, assuming large scale replacement with all new switches as Petitioners do would result in the elimination of the so-called "new switch discount." (*See infra*; VZ-VA Switching Br. at 9-10.)

92/ Memorandum Opinion and Order, *In the Matter of Application by Bell Atlantic New York for Authorization Under Section 271 of the Communications Act to Provide In-Region, Interlata Service in the State of New York*, 15 FCC Rcd 3953, 4085 ¶ 247 (1999) ("*New York § 271 Order*"); *AT&T Corp. v. FCC*, 220 F.3d 607, 617-618 (D.C. Cir. 2000); *see also* VZ-VA Switching Br. at 7-8.

switches," but instead should assume that smaller switches would be used, along with "a mix of smaller switches and so-called add-on modules."[93]

Petitioners' attempt to draw support for their position from the words of a Verizon witness (Dr. Taylor) in a proceeding in Delaware (AT&T/WCom Switching Br. at 7) only underlines the degree to which they grasp at straws. Even leaving aside the fact that the proceeding to which AT&T/WorldCom refer took place during the infancy of TELRIC (Tr. at 3034), Dr. Taylor was not even speaking about the switch discount in the passage Petitioners quote. In fact, as Drs. Shelanski and Tardiff explained in their surrebuttal testimony, Dr. Taylor testified in that same proceeding that an all-new switch discount is not appropriate for a TELRIC study. (VZ-VA Ex. 117 at 21 (citing transcript of Delaware hearings); Tr. at 3035-36 (Tardiff); AT&T/WCom Ex. 106 at 23).) This meager "support" obviously pales in comparison to the subsequent express interpretations by the Commission itself, which make clear that an all-new switch discount is certainly not required by, and is in fact improper under, TELRIC.

Even aside from the clear prior rulings on this issue, logic alone demonstrates that Petitioners' all-new switch proposal is not economically rational or consistent with TELRIC. Petitioners concede that in some cases, "[g]rowing a switch is a [more] rational choice" than "purchasing sufficient capacity up front to meet the total expected demand." (AT&T/WorldCom Switching Br at 9.) As Drs. Shelanski and Tardiff have explained, that choice is always more rational than the large scale instantaneous replacement of all the switches in the network, since the network can never be perfectly sized and will quickly become obsolete. (VZ-VA Ex. 101 at 6-12.) As Ms. Murray acknowledged, efficient deployment in the real world is always based on

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93/ *See* FCC Reply Brief at 9 n.7.

the addition of growth equipment, allowing incremental expansion to meet demand as it develops over time. (Tr. at 3214; *see also* VZ-VA Ex. 117 at 33.) Thus, in contrast to Petitioners' approach, Verizon VA properly assumed that the switch discount should reflect the mix of new and growth purchases that would realistically and efficiently be deployed in a long-run, forward-looking network. (VZ-VA Ex. 101 at 24-25; VZ-VA Ex. 102 at 21-22; VZ-VA Ex. 117 at 32-34.)

Even apart from TELRIC compliance, AT&T/WorldCom's approach fails because the discount they propose is irrational in view of their all-new switch assumption. As Verizon VA has explained, an enormous one-time, network-wide switch replacement would more likely result in an *increase* in switching costs. Since switches would instantly be in much higher demand, vendors could extract higher prices and would not have to offer large discounts as an incentive to purchase. (*See* VZ-VA Ex. 122 at 168-69; Tr. at 2953-54 (Shelanski).) Furthermore, the incentive structure of switch vendors, who offer large new switch discounts specifically to "lock-in" subsequent higher-priced purchases,[94/] would simply not apply under AT&T/WorldCom's instantaneous network-wide replacement assumption. If the hypothetical new carrier were to purchase all new switches sized such that the carrier would never need growth add-ons (because by the time growth exceeds the switch size, apparently the network would be replaced en masse yet again in a new UNE pricing proceeding), the vendor would have no reason to offer any discount on the new switch, as the initial sale would be the vendor's sole opportunity to profit. (*See, e.g.*, Tr. at 2953-54 (Shelanski).) Of course, once the new switch

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[94/] As Verizon VA demonstrated in its initial switching brief, this "lock-in" incentive has been recognized by this Commission and the D.C. Circuit. (*See* VZ-VA Switching Br. at 9-10.)

discount disappears, as it necessarily would, it would be even less efficient for a carrier to replace all of its switches at once. The entire approach is simply implausible.

Petitioners attempt to defend their position on the theory that the MSM's lack of growth discounts is appropriate because growth in network usage has "slowed significantly in recent years," and therefore no additional capacity will need to be added. (AT&T/WCom Br. at 9-10.) AT&T/WorldCom's baseless assertions are belied by their own witnesses, who admit that traffic on the network has grown considerably since 1996.[95] (Tr. at 5150-51, 5266-67; *see also id.* at 5302 (Murphy); *id.* at 5448 (Gansert).)[96] The MSM simply does not account for this growth over the lifetime of a switch. Indeed, this particular claim only makes even a little sense if Petitioners are literally assuming that a carrier will in fact successively replace its network every three years. This assumption is so ridiculous that Petitioners themselves elsewhere label it a caricature of their position. (AT&T/WCom Br. at 105.)

AT&T/WorldCom also suggest that, even if efficient carriers do not use all new switches, using an all-new switch discount is acceptable because the cost of a new switch "sized for reasonably foreseeable demand over its economic life places an upper bound on the forward-looking economic cost of the switch." (AT&T/WCom Br. at 8.) But that could only even begin to be true if all the costs associated with assuming instantaneous replacement of all switches

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[95] As Verizon VA noted in its initial switching brief, growth in usage per line between 1996 and 2000 has been approximately 4.5%. (VZ-VA Switching Br. at 27; Tr. at 5334-35 (Tardiff).)

[96] As Verizon VA notes below and in connection with depreciation, over time traffic will be increasingly diverted from Verizon VA's circuit switches to the packet-switched network. However, no party is proposing to model such a packet-switched network here. TELRIC requires that the network being modeled, including the switches, be able to handle all demand in the state. Thus, the switches in the modeled network must be capable of handling all growth in demand as well.

were included for the new switch. The MSM does nothing like that. First, as Drs. Shelanski, Tardiff, and Vander Weide have repeatedly explained, the successive, instantaneous replacement assumption would require a much higher cost of capital and shorter depreciation lives than Petitioners (or Verizon VA) assume. (VZ-VA Ex. 110 at 7-11; VZ-VA Ex. 117 at 16-17; VZ-VA Ex. 118 at 11-12.) Second, as Dr. Tardiff explained at the hearing, if a new switch were truly sized for all foreseeable demand during its life, it would have to have an extremely large amount of spare capacity and low utilization; the MSM, of course, fails to account for the additional costs that would result from such assumption. (Tr. at 5243-44.)

Perhaps recognizing the fatal flaws in their all-new switch assumption, Petitioners eventually suggest that the MSM actually accounts for switch additions and upgrades. (*See* AT&T/WCom Switching Br. at 8 (stating that model captures "any growth switch additions and upgrades made during [a] three year period").) But this is simply wrong. The Commission made a conscious decision, in designing the universal service switching cost module on which the MSM approach is based, to exclude the discounts associated with switch additions and upgrades. The Commission stated:

> ....in order to estimate the costs associated with the purchase and installation of new switches, and *to exclude the costs associated with upgrading switches*, we . . . remove from the data set those switches installed more than three years prior to the reporting of their associated book-value costs.[97]

Indeed, Ms. Murray agreed at the hearing with Mr. Kwiatkowski's observation that "it would appear that the FCC's inputs are based on costs for new switches." (Tr. at 5295.)

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[97] *Tenth Report and Order* at 20289 ¶ 315 (emphasis added); *see also id.* at Appendix C, ¶ 2 (noting that the three-year restriction eliminated 70% of the switches in the underlying data set).

Notwithstanding their assertions that there must be some growth equipment in their study somewhere, Petitioners' own witnesses conceded at the hearing they had no idea how much, if any. All Ms. Murray could muster was that "[w]e don't know that [the switching equipment in the MSM is] 100 percent" new. (Tr. at 5295, 5142-43.)

Once Petitioners' nonsensical assumption of an all-new switch discount is set aside, the key question is what is an appropriate mix of new and growth switching equipment. As Verizon VA explained in its initial switching brief, Verizon VA's switching studies assume a mix of new and growth switch discounts that are based on actual year 2000 purchases for Lucent and Siemens, and the current contracts for Nortel purchases. (VZ-VA Switching Br. at 3-6.) These purchases represent the discounts Verizon VA can realistically expect to receive, as well as the mix of new and growth switches that Verizon VA would purchase to incrementally expand its network. (*See* VZ-VA Ex. 122 at 4.)

Staff suggested during the hearings that an alternative approach might be to look at what percentage of the total network investment was purchased at the new switch discount and what percentage was purchased at the growth discount. (VZ-VA Ex. 212.) As Verizon VA explained in its initial switching brief, although it could not provide precisely this information, based on available data for five years the breakdown was approximately 50/50 — that is, Verizon-East purchased new switch equipment to serve about 50% of its lines and purchased growth equipment to serve the other 50%.[98] (VZ-VA Ex. 213.) The resulting "life-cycle discount" that Verizon calculated is extremely generous since vendors are currently offering particularly steep

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[98] This actual data puts to rest Petitioners' alternative proposal, based on empty theorizing and numerous unsupported assumptions, that new switches should be weighted at 90% in calculating a discount. (AT&T/WCom Switching Br. at 10.)

discounts due to the fact that digital switching is reaching the end of its life cycle. (*See* VZ-VA Switching Br. at 5-6.) Nonetheless, the 50/50 split drawn from this additional data clearly reflects a more realistic picture of an efficient mix of technology than AT&T/WorldCom's 100% new switch assumption.

Contrary to Petitioners' claims (AT&T/WCom Switching Br. at 13-15), Verizon VA's approach appropriately reflects the long run decisions that an efficient carrier would make. As Drs. Shelanski and Tardiff have explained, Verizon VA's studies account, to the extent TELRIC permits, for the fact that no carrier operating in the real world would place an entire network of new switches instantaneously. Rather, carriers, because future demand and technologies are uncertain, will replace equipment incrementally and buy some new and some growth equipment over time. (VZ-VA Ex. 117 at 4-7.) A real-world, efficient carrier's network therefore will have *over the long run* a mix of such technologies. Verizon VA's studies provide the best estimate of that mix for a TELRIC study — and certainly one that is superior to Petitioners' assumption of 100% all new switches.

2. Traffic Sensitivity and Rate Structure

a) Petitioners Misidentify the Traffic Sensitive Resources of Switches.

Petitioners concede that the allocation of costs between traffic sensitive and non-traffic sensitive rate elements should be based on cost causation. (*See* AT&T/WCom Switching Br. at 16.) As Verizon VA explained in its initial switching brief, its studies comply with that principle, assigning the costs of those switch resources that increase with increased usage to minute-of-use ("MOU") charges, and the remaining costs (those of the port) to a non-traffic sensitive, flat-rate charge. (VZ-VA Switching Br. at 16-17; VZ-VA Ex. 122 at 191-92; VZ-VA Ex. 123 at 6-8.) Verizon VA's studies produce a 63.16% traffic sensitive and 36.84% non-traffic sensitive split, one that is similar to the 70%/30% split in the Commission's Synthesis Model. (VZ-VA Switching Br. at 17.)

Notwithstanding their purported adherence to the principle of cost causation, Petitioners propose a traffic sensitive/non-traffic sensitive split that completely contradicts it. After numerous revisions to their switching study, AT&T/WorldCom eventually arrived at a 23% traffic sensitive/77% non-traffic sensitive division — one that essentially reverses the default assumption in the Synthesis Model.[99] (VZ-VA Switching Br. at 17-18.) Indeed, this is the only change Petitioners make to the Synthesis Model's switching module, not for any principled reason, but because in this particular instance that model produces costs that are higher than AT&T/WorldCom would like. AT&T/WorldCom claim that they have somehow "demonstrated that switching costs are largely non-traffic sensitive" (AT&T/WCom Br. at 16), and therefore that their traffic sensitive/non-traffic sensitive division makes sense, but nothing could be further from the truth. Petitioners' position is based almost exclusively on their contention that, because "the primary limiting factor in today's digital switch is not processing capacity but rather the exhaustion of the number of ports," processor and related costs should not be deemed traffic sensitive. (AT&T/WCom Switching Br. at 16-17.) In particular, AT&T/WorldCom claim that

[99] AT&T/WorldCom have actually proposed an even greater shift to non-traffic sensitive costs for Verizon's SCIS model, contending that for SCIS, only 16% of switching costs should be treated as traffic sensitive, compared to the 23% they propose for the MSM. (AT&T/WCom Switching Br. at 19.) Petitioners nowhere explain this disparity. Nor have they shown that the split they propose for the MSM reflects the switch mix underlying the Synthesis Model's (and hence the MSM's) default switch prices. Indeed, they cannot; the Commission itself noted that the Synthesis Model does not contain evidence regarding state specific switch investment. *Tenth Report and Order* at 20290 ¶ 318. There is thus no way to verify that the base from which the traffic sensitivity factors are developed is consistent with the base to which it is being applied. Not surprisingly, not one state regulatory commission has adopted AT&T/WorldCom's proposed traffic sensitivity split. (Tr. at 5484-85 (Pitts).)

costs associated with a switch's memory and processor should not be treated as traffic sensitive. But their position and the analysis on which they rely simply do not accord with the basic facts concerning switch design, technology, and the way switch resources are used.

First, as Verizon VA has repeatedly demonstrated, although the goal is to engineer switches so they have sufficient capacity to handle expected usage, the fact remains that usage can and does lead to the exhaust of non-port switch resources. (VZ-VA Switching Br. at 18; VZ-VA Ex. 123 at 6-8.) Precisely for this reason, switch processors include tools that are designed to decrease the chance of real exhaust situations. (VZ-VA Ex. 123 at 7-8.) Nevertheless, throughout its switching network, Verizon VA has in fact upgraded and expanded non-port switch components, including processor resources, as a result of exhaustion due to usage. (VZ-VA Ex. 122 at 176-78.)[100/]

Second, AT&T/WorldCom's premise that memory and processor costs are not usage sensitive is itself based on flawed logic. Petitioners' theory appears to be that since processor and memory costs are "incurred at the time a switch is placed in operation," and thus are so-called "getting started" costs, they by definition cannot vary with usage and must be deemed non-traffic sensitive. (AT&T/WCom Br. at 16.) In other words, the principle on which they appear to rely is that whether a cost varies with usage or not depends on *when the cost is incurred.* But this makes no sense. As Verizon VA's witnesses repeatedly explained, switch resources shared among users are sized before deployment based on expected *usage levels*; the

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100/ Ms. Pitts's analysis of Verizon VA's switch processor utilization inputs in SCIS, which AT&T/WorldCom claim demonstrates that processor-related costs are non-traffic sensitive and that processor upgrades are never necessary (AT&T/WCom Switching Br. at 17), actually shows only that Verizon VA seeks to *avoid* processor exhaust situations. (VZ-VA Ex. 123 at 6-8.)

size of those resources (and therefore their cost) increases with the level of expected usage. (VZ-VA Switching Br. at 19; VZ-VA Ex. 109 at 53-55; VZ-VA Ex. 122 at 191-93; Tr. at 5447-51 (Gansert).)

AT&T/WorldCom next suggest that Verizon VA's success in designing switches so that they do not frequently exceed the processor limit is evidence that processor costs are not traffic-sensitive. (AT&T/WCom Switching Br. at 17-18.) But the testimony of Mr. Gansert, on which they rely for this point, was perfectly clear: switches will not exhaust because of processor capacity limitations as long as "vendors . . .increas[e] the capacity of their switches" to include enough processor capacity to *anticipate* usage. (Tr. at 5449 (Gansert).) Indeed, Petitioners' reliance on the fact that Verizon VA has frequently been able to accurately anticipate processor needs is somewhat puzzling: it suggests Petitioners agree that in those instances where additional investment *is* required because "you exceed the [processor] limit" (Tr. at 5449 (Gansert)), the processor capacity *would* be traffic-sensitive. But, of course, it makes no sense to classify costs as traffic sensitive versus non-traffic sensitive based on the accuracy of ex ante *predictions* about usage. (Tr. at 5451 (Gansert) (classification of costs as traffic sensitive should not depend on "whether you buy it all up front or you buy it in three pieces or ten pieces").) Nonetheless, their logic demonstrates that even Petitioners concede that usage can affect the need for processor capacity, and processor costs therefore should be recovered through traffic sensitive rates.[101/]

101/ Indeed, the MSM's own documentation reinforces this point, indicating that a new switch would have to be deployed if certain capacity limits applied to the MSM's initial switching investment were exceeded. (*See* HAI 5.0a Model Description at 55-56; *Tenth Report and Order* at 20295 ¶ 328; VZ-VA Ex. 109 at 55.)

Finally, Petitioners' position makes no economic sense. (AT&T/WCom Br. at 18-19.) As Verizon VA has explained, failure to recover usage based costs on a traffic sensitive basis would result in low volume users subsidizing high volume users, contrary to both economic principles and sound policy objectives. (VZ-VA Switching Br. at 20-21; Tr. at 5461-62 (Tardiff).) When the cost of shared resources varies with expected usage levels, that cost should be recovered based on how much of those resources each customer consumes. (VZ-VA Ex. 122 at 191-92.) Such an approach, far from sending the "wrong pricing signals" as Petitioners suggest (AT&T/WCom Br. at 18-19), sends the appropriate signal. As Dr. Tardiff explained, if costs are higher with more usage, then prices "need to send a signal to reflect that reality." (Tr. at 5461-62.) By recovering switch costs that vary with usage through traffic-sensitive rates, Verizon VA's studies do just that.

b) The Commission Should Not Adopt Either Worldcom or AT&T's Proposed Switching Rate Structure.

Petitioners compound their misallocation of costs between traffic sensitive and non-traffic sensitive by proposing rate structures that have nothing at all to do with cost causation. In fact, WorldCom, notwithstanding its recognition that at least some switching costs are traffic sensitive, proposes to recover all costs through a single flat-rate for switching UNEs. (AT&T/WCom Switching Br. at 26.) Not even AT&T is willing to defend that proposal. But AT&T's suggestion — which would give CLECs the choice between a pure flat-rate or a combination flat-rate and MOU rate (AT&T/WCom Switching Br. at 27-29) — also does not comport with principles of cost causation. Both proposals would promote inefficient usage of Verizon VA's switching network, lead to network congestion, and encourage CLECs to engage in regulatory arbitrage. The result of either proposal is that Verizon VA would be unable to recover its forward-looking switching costs.

Even while conceding that "charges should reflect costs" (AT&T/WCom Switching Br. at 25), WorldCom does not pretend to defend its proposal based on cost-causation principles. Instead, it simply asserts that its proposal "would be easy to administer and audit" and would avoid conflict over appropriate usage assumptions. (AT&T/WCom Switching Br. at 26.) But even AT&T's own witnesses disagree: they observed that CLECs already have developed business plans based on the traditional port/MOU rate structure and that *additional* administrative costs would be incurred if this approach were abandoned. (AT&T Ex. 4 at 15.) Furthermore, contrary to WorldCom's contention, a single flat-rate would still require assumptions about usage. Because all parties agree that at least *some* switch costs are traffic sensitive, determining the total of all switching costs — a necessary step in determining the appropriate flat-rate to assess each user — would inevitably require assumptions regarding average usage across all customers, including high use business customers and low volume residential customers. (*See* VZ-VA Ex. 115 at 3.) Thus, in addition to producing the problematic result that carriers targeting high use consumers would receive a windfall from carriers serving lower use consumers, WorldCom's proposal is impractical and senseless.

AT&T's alternative, under which a single flat-rate would be an option that a CLEC could choose, fares no better and would in fact add an additional layer of potential arbitrage and administrative complexity. (*See* VZ-VA Ex. 115 at 4.) AT&T admits that carriers would have the incentive to purchase the flat-rate option for high volume users and the port/MOU rate structure for lower usage consumers. (AT&T Ex. 4 at 13; AT&T/WCom Switching Br. at 28.) AT&T's proposed solution, that a carrier be required to chose one rate option for all customers in each carrier code (AT&T/WCom Switching Br. at 28), does little to solve this problem. In particular, AT&T ignores the real possibility of arbitrage among CLECs with different business plans, which would cause CLECs with relatively low usage customers (*i.e.*, residential) to subsidize carriers serving higher usage customers (*i.e.*, business). (*See* VZ-VA Ex. 115 at 5.)

AT&T's proposal would almost guarantee that Verizon VA would not recover its forward-looking switching costs. As Mr. West explained, under AT&T's optional rate structure, "carriers would gravitate to the option that best suits them." (Tr. at 5474.) If any particular CLEC could benefit by opting for the single flat-rate structure, it would naturally select that option in order to reduce its payments to Verizon VA. A CLEC whose costs would be lower under the traditional structure would select that one. The inevitable result is that Verizon VA's aggregate switching revenue would not recover its forward-looking switching costs.[102/]

3. AT&T/WorldCom's Additional Criticisms of Verizon VA's Switching Studies Are Baseless.

a) Verizon VA's Revision to Its Switching Studies to Correct the Forward-Looking Line Count Does Not Overstate Costs as Petitioners Claim.

Petitioners' claim that Verizon VA's correction to its switching study so that it included an appropriate forward-looking line count overstates costs (AT&T/WCom Br. at 21-22) both confuses two separate issues and is incorrect. As Verizon VA has previously explained, in its initial switching studies the TR-008 lines Verizon intended to model on the Lucent 5ESS switches were, although correctly input by Verizon VA, ultimately dropped by SCIS and not

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[102/] Petitioners' reference to the rates Verizon VA offers retail customers (AT&T/WCom Switching Br. at 26, 28) is irrelevant. The fact that Verizon might typically offer its local exchange customers flat-rate switching does not change the fact that switching costs are incurred on a usage basis. (*See* VZ-VA Ex. 115 at 6.) Every carrier is free to decide how to structure end-user retail rates based on its business plan, its perceptions of consumer desires, and any other factor it wishes to consider. (*See* Tr. at 5480 (West).) But UNE rates are required to recover Verizon VA's forward-looking *costs* in the manner in which they are incurred.

included in its investment outputs because SCIS version 2.8 does not model TR-008 lines on the Lucent SM2000 platform. (*See* VZ-VA Ex. 125 at 2-3.) To correct this error and produce the best estimate of forward-looking costs, Verizon VA worked with Telcordia and determined that these TR-008 lines could be modeled as GR-303 lines with a 1:1 concentration ratio. (*See* VZ-VA Ex. 125 at 3; VZ-VA Ex. 226 (VZ-VA Responses to AT&T/WorldCom 12-3, 12-11, 12-19, Supplemental Response to AT&T/WorldCom 12-43).) As Verizon VA explained in discovery, as a result of this fix, the cost for these lines in its studies is overstated by 2% because it reflects the packet equipment costs for GR-303 lines that would not be required for TR-008 lines. (VZ-VA Ex. 226 (VZ-VA Supplemental Response to AT&T/WorldCom 12-43).)

AT&T/WorldCom erroneously contend that Verizon VA's solution actually overstated costs by 9%. (AT&T/WCom Switching Br. at 21.) Petitioners' analysis is based on their claim that Verizon VA should have accounted for the savings due to line concentration produced by GR-303.[103] But line concentration is not possible with TR-008 technology, and Verizon VA's fix in the SCIS model is designed to account for TR-008 lines by using GR-303 as a modeling proxy; there is no assumption that all lines in the forward-looking switch actually would be GR-303. Petitioners' claim is really nothing more than a rehash of their argument that Verizon VA should have assumed more GR-303. Verizon VA already explained in its initial switching brief

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[103] AT&T/WorldCom's calculation is based on their assumption of a 4:1 GR-303 line concentration, which, as Verizon VA explained in its initial switching brief, is itself overstated. (*See* VZ-VA Switching Br. at 14-16.)

why AT&T/WorldCom are wrong on this point, and they do not even directly address the issue in their brief.[104] (*See* VZ-VA Switching Br. at 12-16.)

b) Verizon VA Has Properly Modeled Combination Local/Tandem Switching Costs.

Verizon VA's revised tandem switching studies propose reasonable, forward-looking rates for tandem switching. (*See* VZ-VA Ex. 161 at 1-9.) AT&T/WorldCom contend that Verizon VA should have adjusted the Lucent end office costs to reflect alleged efficiencies gained from combination local/tandem switches. (AT&T/WCom Switching Br. at 22.) But it is unclear why AT&T/WorldCom believe that the investment calculated by SCIS would be reduced as they suggest. SCIS produces the total investment for all types of switches in Verizon VA's network, including combination local/tandem switches. (VZ-VA Ex. 161 at 5-6.) Verizon VA allocated the investments for combination local/tandem switches by leaving end office rates the same and calculating the incremental costs of only the additional tandem trunks that are present in a combination local/tandem switch. (VZ-VA Ex. 161 at 6; *see also* VZ-VA Response to AT&T/WorldCom 14-10.) Although one could instead reallocate the cost of combination local/tandem switches between end office and tandem trunk costs, the same investment dollars would then simply be allocated differently. AT&T/WorldCom offer no basis for their claim that

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[104] AT&T/WorldCom assert in passing that SCIS's inability to model TR-008 on the SM2000 platform demonstrates that TR-008 is not a forward-looking technology. (AT&T/WCom Switching Br. at 21.) This is nonsense. Telcordia's decisions concerning the modeling capabilities that it developed for the SM2000 platform were made over the past decade. (*See* VZ-VA Ex. 216 (VZ-VA Response to AT&T/WorldCom 12-7).) As Mr. Garfield explained at the hearing, when Telcordia was developing the SM2000 capabilities in SCIS, GR-303 "was the latest and greatest digital loop carrier system," but carriers' problems deploying GR-303 since that time have led Telcordia to internally reconsider the decision not to model TR-008 on the SM2000 platform. (Tr. at 5378-79.)

this would produce a net deduction in investments. (VZ-VA Ex. 161 at 5-6, 8; *see also* VZ-VA Ex. 226 (VZ-VA Responses to AT&T/WorldCom 14-10 and AT&T/WorldCom 14-1).)

c) Verizon VA's Appropriately Removed "Getting Started" and RTU Costs From Its Reciprocal Compensation Rates.

Verizon VA appropriately estimated the forward-looking costs for reciprocal compensation, which include the *additional* costs of terminating such calls. (VZ-VA Ex. 107 at 203-04.) This complies with the 1996 Act's mandate. (VZ-VA Ex. 107 at 204; Tr. at 5483.) AT&T/WorldCom argue that Verizon VA should have included "getting started" and RTU costs in costs for all traffic, including reciprocal compensation rates — or else that the costs should be identified as non-traffic sensitive. (AT&T/WCom Br. at 24-25.) But Petitioners offer no reason to ignore the statutory requirement to model only the additional costs incurred by local traffic when calculating reciprocal compensation costs, nor do they explain how the calculation of reciprocal compensation rates would justify the recovery of traffic-sensitive UNE switching costs on a non-traffic sensitive basis. "Getting started" and RTU costs are not additional costs incurred by Verizon VA when terminating traffic and thus were appropriately excluded from reciprocal compensation. (VZ-VA Ex. 122 at 32-33.)

d) Verizon VA's RTU Assumptions Are Accurate Estimates of Forward-Looking RTU Fees.

AT&T/WorldCom criticize the RTU costs Verizon VA included in its switching studies based on their claim that some of these expenses are "'catch-up' payments to bring software current." (AT&T/Com Switching Br. at 22.) Petitioners offer no explanation of what they mean by "catch-up" payments and have not shown — and cannot show — that Verizon VA's RTU costs are anything other than routine software purchases required to maintain and upgrade existing switches, to comport with vendor requirements. (VZ-VA Switching Br. at 22; VZ-VA Ex. 122 at 199-200.) The sole document on which they purport to rely shows just that — a list of routine upgrades that Verizon VA expects to perform on a forward-looking basis, not unique "catch up" buyouts. (*See* Tr. at 5158-61.)

AT&T/WorldCom also criticize Verizon VA's inclusion of 1999 RTU fees, arguing that they reflect "a one-time expense." (AT&T/WCom Switching Br. at 23.) As Verizon VA has explained, however, these costs were properly included. (VZ-VA Switching Br. at 23-24.) The 1999 change in accounting practices that Mr. Minion explained at the hearing (Tr. at 5438-39) was not a "one-time expense to comply" with new practices, as Petitioners contend (AT&T/WCom Switching Br. at 23), but rather the initial implementation of the method of capitalizing costs that Verizon VA continues to employ. Since 1999 was the first year of RTU data used in Verizon VA's switching studies and these costs will be capitalized in this manner for the foreseeable future, these costs should not be excluded as AT&T/WorldCom propose.[105/] Petitioners' suggestion that the 1999 costs included other "one time software buyouts" is simply a bald allegation that they do not even attempt to support with purported evidence. (*See* AT&T/WCom Switching Br. at 23.)[106/]

105/ Verizon VA has demonstrated that RTU costs are properly identified as traffic sensitive, since software would need to be supplemented in the event of a processor augmentation caused by higher than expected usage. (*See* VZ-VA Switching Br. at 20, n.25, VZ-VA Ex. 122 at 200-01.) AT&T/WorldCom's implication that Verizon VA witnesses conceded RTU costs should not be identified as traffic sensitive is misleading; in fact, Mr. Gansert, Mr. Minion, and Ms. Matt simply explained that RTU purchases are typically performed on a buyout, or per-switch, basis. (Tr. at 5490-96.)

106/ As Verizon VA explained in its initial switching brief, AT&T/WorldCom's study fails to include the significant RTU costs associated with new switches (*see* VZ-VA Switching Br. at 22-

e) **Verizon VA's Proposed EF&I Switching Factor Is Well-Supported and Appropriate.**

AT&T/WorldCom again criticize Verizon VA's **[BEGIN VERIZON PROPRIETARY]** XXXX **[END VERIZON PROPRIETARY]** switching EF&I factor, but offer no convincing support for their alternative proposal.[107] (AT&T/WorldCom Switching Br. at 23-24.) Contrary to Petitioners' claims, Verizon VA provided complete and extensive documentation of the supporting data used to develop Verizon VA's factor. (*See* VZ-VA Ex. 122 at 46.) And while AT&T/WorldCom have criticized Verizon VA's reliance on data from 1998 as outdated, their criticism of and counterproposal to Verizon VA's proposed factor are based on figures adopted by the Commission in the Universal Service proceedings and carrier filings in the 1992 Open Network Architecture proceeding — data which is, as Verizon VA has explained, both "outdated" and otherwise inappropriate.

The switching equipment being deployed today is significantly different from that used at least a decade ago. Consequently, it cannot be assumed that the engineering, installation, and furnishing techniques today are identical to those used for the 1992 (or Universal Service proceeding) calculations on which Petitioners rely. Furthermore, since the EF&I factor is a ratio of costs to investments, a 1992 factor cannot be blindly applied as AT&T/WorldCom suggest: switching equipment costs ten years ago no doubt were different from today's costs. Thus, even

23; VZ-VA Ex. 122 at 198), even though they have actually assumed all new switches for their study. AT&T/WorldCom have yet to offer any explanation for this inconsistency.

[107] Petitioners also suggest that Verizon VA's EF&I factor should be questioned because Verizon VA's DCPR database is unreliable (AT&T/WCom Switching Br. at 23), but the only allegation they have made about that database is that it does not produce the accurate installation costs for individual pieces of equipment — something it never purports to do, as explained above.

if the 1992 EF&I costs somehow were relevant, the 1992 factor would have to be recalculated to reflect different investment levels. (VZ-VA Br. at 60-61.)

4. The MSM Cannot Produce Accurate Cost Estimates for Switching UNEs.

As Verizon VA has demonstrated, the MSM's switching module is wholly inappropriate for use in estimating switching UNE costs. Developed for universal service purposes, as AT&T/WorldCom fully acknowledge, the MSM lacks the necessary sophistication to accurately estimate the full complement of switching UNEs. And with respect to the few switching UNEs for which the MSM is capable of producing cost estimates, it produces patently unreasonable results. The assumptions and methodologies employed by the MSM's switching module bear little or no relation to the cost of providing service in Virginia, are inconsistent with widely-accepted network design practices, and have never been verified against any real-word data.

That the MSM cannot produce accurate switching costs stems directly from the fact that it is based almost entirely on the Synthesis Model. The Synthesis Model is designed to estimate the relative cost differences among states — as such, the calculation of accurate switching costs is not a central concern. The Commission has explicitly recognized that, for universal service purposes, the focus is primarily on the development of proper loop costs, not switching costs.[108/] For UNE costing purposes, however, accurate estimates of switching costs are critical.

108/ Fifth Report and Order, *In re Federal-State Joint Board on Universal Service, In re Forward-Looking Cost Mechanism for High Cost Support for Non-Rural LECs*, 13 FCC Rcd 21323, 21354-55, ¶ 75 ("[F]or universal service purposes, where cost differences caused by differing loop lengths are the most significant cost factor, switching costs are less significant than they would be in, for example, a cost model to determine unbundled network elements switching and transport costs.").